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ANALYTICAL APPROXIMATIONS

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Analytical Approximation

Chi-Square Integral: To better than .0003 over $m \leq \chi^2 < \infty$ and $2 < m < \infty$, m being considered a continuous parameter,

$$F_m(\chi^2) = \frac{1}{2\Gamma\left(\frac{m}{2}\right)} \int_0^{\chi^2} \left(\frac{z}{2}\right)^{\frac{m}{2}-1} e^{-z/2} dz$$

$$\doteq 1 - \frac{A}{\left[1+a_1t+a_2t^2+a_3t^3+a_4t^4\right]^4}.$$

$$t = \sqrt{\chi^2} - \sqrt{m}$$

$$A = .5 \quad -.1323\left(\frac{2}{m}\right)^{1/2} -.0036\left(\frac{2}{m}\right) +.0038\left(\frac{2}{m}\right)^{3/2}$$

$$a_1 = .2784 + .0783\left(\frac{2}{m}\right)^{1/2} -.0051\left(\frac{2}{m}\right)$$

$$a_2 = .2304 - .0247\left(\frac{2}{m}\right)^{1/2} -.0018\left(\frac{2}{m}\right)$$

$$a_3 = .0010 + .0592\left(\frac{2}{m}\right)^{1/2} -.0852\left(\frac{2}{m}\right) +.0398\left(\frac{2}{m}\right)^{3/2}$$

$$a_4 = .0781 - .0906\left(\frac{2}{m}\right)^{1/2} +.0923\left(\frac{2}{m}\right) -.0366\left(\frac{2}{m}\right)^{3/2}.$$

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